What is claimed is:

1. An electronic component cooling apparatus comprising:

a heat sink having an electronic component mounting surface on which an electronic component to be cooled is mounted and a coolant path with a coolant inlet and a coolant outlet through which a liquid flows as a coolant to forcibly cool the electronic component mounting surface;

a radiator having a liquid path with a coolant inlet and a coolant outlet through which the coolant flows and adapted to air-cool the liquid path to cool the coolant;

a motor-driven fan mounted at a heat dissipating portion of the radiator to supply cooling air to the radiator;

a first coolant path connecting the coolant outlet of the heat sink to the coolant inlet of the radiator;

a second coolant path connecting the coolant outlet of the radiator to the coolant inlet of the heat sink; and

a motor-driven pump installed in the first coolant path or the second coolant path to give a moving energy to the coolant:

wherein the motor-driven fan includes:

an air channel body having a suction port at one

end thereof facing a front of the heat dissipating portion of the radiator and a discharge port at the other end thereof;

an impeller having a plurality of blades, at least a part of the impeller being arranged inside the air channel body;

a motor for rotating the impeller so as to draw in air through the suction port and discharge air from the discharge port; and a plurality of engaging pieces integrally provided at the air channel body; and

wherein the radiator has a plurality of engaged portions with which the plurality of the engaging pieces engage.

2. The electronic component cooling apparatus as defined in claim 1, wherein the plurality of blades each have an edge facing the front of the heat dissipating portion, each of the edges sloping gradually away from the dissipating portion as each of the edges extends in a radially outward direction from a rotating center of the impeller.

3. The electronic component cooling apparatus as defined in claim 1, wherein a plurality of webs connecting a housing of the motor and an end portion of the air channel body on the side of the discharge port are situated outside the discharge port or the end portion on the side of the discharge port is lower than an uppermost surface of the housing of the motor.

4. An electronic component cooling apparatus comprising:

a heat sink having an electronic component mounting surface on which an electronic component to be cooled is mounted and a coolant path with a coolant inlet and a coolant outlet through which a liquid flows as a coolant to forcibly cool the electronic component mounting surface;

a radiator having a liquid path with a coolant inlet and a coolant outlet through which the coolant flows and adapted to air-cool the liquid path to cool the coolant;

a motor-driven fan mounted at a heat dissipating portion of the radiator to supply cooling air to the radiator;

a first coolant path connecting the coolant outlet of the heat sink to the coolant inlet of the radiator;

a second coolant path connecting the coolant outlet of the radiator to the coolant inlet of the heat sink; and

a motor-driven pump installed in the first coolant path or the second coolant path to give a moving energy to the coolant:

wherein the heat sink has a base plate which has the electronic component mounting surface and a heat dissipating surface, the heat dissipating surface

being opposite to the electronic component mounting surface in a thickness direction of the base plate and in direct contact with the coolant, the heat dissipating surface being so shaped as to have at least one pair of sides facing each other;

wherein the heat sink has the coolant inlet and the coolant outlet so that the coolant can flow from one of the sides of the heat dissipating surface to the other side of the heat dissipating surface; and

wherein the base plate is so shaped in a transverse cross section as to form a resistance increasing portion between the one side and the other side of the heat dissipating surface for increasing a resistance against a flow of the coolant.

5. The electronic component cooling apparatus as defined in claim 4, wherein the resistance increasing portion is a raised portion which is formed by increasing a thickness of the base plate from the one side or the other side of the heat dissipating surface toward a center of the heat dissipating portion.

6. The electronic component cooling apparatus as defined in claim 5, wherein the heat dissipating surface has a plurality of radiation fins formed integrally therewith, and

the plurality of radiation fins each extend in a first direction from the one side to the other side

and are arranged along the heat dissipating surface at predetermined intervals in a second direction perpendicular to the first direction.

7. The electronic component cooling apparatus as defined in claim 6, wherein the heat sink has a top plate facing the base plate with a predetermined space therebetween and a peripheral wall portion connecting the base plate and the top plate,

the coolant inlet and the coolant outlet are so formed near the one side and the other side respectively as to pierce through the top plate in a thickness direction thereof, and

positions of both end portions, with respect to the first direction, of the plurality of radiation fins are so determined that flow speeds of the coolant do not vary excessively greatly among flow passages each formed between two adjacent radiation fins as the coolant flows in at the coolant inlet and flows out of the coolant outlet through the flow passages.

8. A motor-driven pump used in an electronic component cooling apparatus, comprising:

a rotor having a rotating body, a plurality of rotary side magnetic poles and a shaft, the rotating body having a cylindrical peripheral wall portion and a closing wall portion integrally formed with the peripheral wall portion to close one end of an inner space enclosed by the peripheral wall portion, the

rotary side magnetic poles being formed from permanent magnets and arranged on an inner peripheral surface of the peripheral wall portion, the shaft being fixed at one end thereof to a center of the closing wall portion and extending through a center of the peripheral wall portion;

a bearing rotatably supporting the shaft;

a cylindrical bearing holder in which the bearing is fitted and held;

a stator having a stator core mounted on an outer periphery of the bearing holder and arranged inside the rotating body and a plurality of excitation coils wound around the stator core;

an exciting current supply circuit for supplying an exciting current to the plurality of excitation coils;

a waterproof structure including a seal member for watertightly closing one of open ends of the bearing holder which does not face the closing wall portion of the rotating body, the waterproof structure being adapted to waterproof the stator and the exciting current supply circuit;

an impeller having a blade mounting portion arranged on at least the closing wall portion of the rotating body and a plurality of blades provided at the blade mounting portion; and

a housing having a liquid inlet and a liquid

outlet and accommodating therein elements such as the rotor, the impeller and the stator,

wherein when the rotor, the impeller and the bearing are submerged in the coolant and the impeller is rotated, the housing draws in the liquid coolant through the liquid inlet and discharges it from the liquid outlet.

9. The motor-driven pump as defined in claim 8, wherein the closing wall portion of the rotating body is formed with one or more through-holes extending therethrough in a thickness direction thereof to allow the coolant to flow through the closing wall portion.

10. The motor-driven pump as defined in claim 9, wherein the blade mounting portion of the impeller has a portion that faces almost entirely the closing wall portion of the rotating body, and the portion is formed with one or more through-holes aligned with the one or more through-holes.

11. The motor-driven pump as defined in claim 8, wherein the blade mounting portion of the impeller has a cylindrical extended mounting portion extending along the peripheral wall portion of the rotating body, and the plurality of blades are each shaped to extend continuously from over the blade mounting portion to over the cylindrical extended mounting portion.

12. A motor-driven pump usable in an electronic component cooling apparatus, comprising:

a rotor having a rotating body, a plurality of rotary side magnetic poles and a shaft, the rotating body having a cylindrical peripheral wall portion and a closing wall portion integrally formed with the peripheral wall portion to close one end of an inner space enclosed by the peripheral wall portion, the rotary side magnetic poles being formed from permanent magnets and arranged on an inner peripheral surface of the peripheral wall portion, the shaft being fixed at one end thereof to a center of the closing wall portion and extending through a center of the peripheral wall portion;

two bearings spaced from each other in an axial direction of the shaft to rotatably support the shaft;

a cylindrical bearing holder in which the two bearings are fitted and held;

a retainer mechanism arranged between the other end of the shaft and one of the two bearings which is situated on an opposite side to the closing wall portion and adapted to prevent the shaft from coming off;

a stator having a stator core mounted on an outer periphery of the bearing holder and arranged inside the rotating body and a plurality of excitation coils wound around the stator core;

an exciting current supply circuit for supplying an exciting current to the plurality of excitation

coils;

a waterproof structure including a seal member for watertightly closing one of open ends of the bearing holder which does not face the closing wall portion of the rotating body, the waterproof structure being adapted to waterproof the stator and the exciting current supply circuit;

an impeller having a blade mounting portion arranged on at least the closing wall portion of the rotating body and a plurality of blades provided at the blade mounting portion; and

a housing having a liquid inlet and a liquid outlet and accommodating therein elements such as the rotor, the impeller and the stator,

wherein when the rotor, the impeller and the two bearings are submerged in the coolant and the impeller is rotated, the housing draws in the liquid coolant through the liquid inlet and discharges it from the liquid outlet.

13. The motor-driven pump as defined in claim 12, wherein at least one liquid path extending along the shaft is formed between an inner peripheral surface of the bearing holder and an outer peripheral surface of each of the two bearings.

14. The motor-driven pump as defined in claim 13, wherein at least one groove extending along the shaft is formed in that portion of the inner peripheral

surface of the bearing holder which faces the outer peripheral surface of the bearings, and the groove constitutes the liquid path.

15. The motor-driven pump as defined in claim 14, wherein a plurality of the grooves are formed at equal intervals in a peripheral direction.

16. The motor-driven pump as defined in claim 14, wherein the inner peripheral surface of the bearing holder is formed with one or more narrow elongate grooves that extend along the shaft and face the outer peripheral surfaces of the two bearings, respectively, and the one or more narrow elongate grooves constitute the liquid path.

17. The motor-driven pump as defined in claim 13, wherein the bearings are ball bearings.

18. A radiator used in an electronic component cooling apparatus, comprising:

a plurality of liquid passages arranged side by side;

radiation fins attached to outer surfaces of the liquid passages; and

two liquid tanks arranged each on either side of the plurality of liquid passages and communicably connected to both ends of the plurality of liquid passages;

wherein one of the two liquid tanks is provided with a liquid inlet and the other liquid tank is

provided with a liquid outlet;

wherein a chamber in each of the two liquid tanks is divided, in a direction of arrangement of the plurality of liquid passages, into m plus one (m is an integer of one or more) sub-chambers by m partition walls; and

wherein the sub-chambers in each of the two liquid tanks and the plurality of liquid passages are connected with each other in such a manner that one or more of the liquid passages construct a winding liquid path between the liquid inlet and the liquid outlet.

19. The radiator as defined in claim 18, wherein the sub-chamber located uppermost in the other of the two liquid tanks has such shape and size that allow a space to be formed therein that is positioned higher than the sub-chamber located uppermost in the one of the two liquid tanks and that is not filled with the liquid.

20. A radiator used in an electronic component cooling apparatus, comprising:

a plurality of liquid passages arranged side by side;

radiation fins attached to outer surfaces of the liquid passages; and

two liquid tanks arranged one on each side of the plurality of liquid passages and communicably connected to both ends of the plurality of liquid

passages;

wherein one of the two liquid tanks is provided with a liquid inlet and a liquid outlet;

wherein a chamber in the one of the two liquid tanks is divided, in a direction of arrangement of the plurality of liquid passages, into n plus one (n is an integer of two or more) sub-chambers by n partition walls;

wherein a chamber in the other of the two liquid tanks is divided, in a direction of arrangement of the plurality of liquid passages, into n sub-chambers by n minus one partition walls; and

wherein the sub-chambers in each of the two liquid tanks and the plurality of liquid passages are connected with each other in such a manner that one or more of the liquid passages construct a winding liquid path between the liquid inlet and the liquid outlet.

21. The radiator as defined in claim 20, wherein the sub-chamber located uppermost in the other of the two liquid tanks has such shape and size that allow a space to be formed therein that is positioned higher than the sub-chamber located uppermost in the one of the two liquid tanks and that is not filled with the liquid.